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Preface to Occupational Immunology

Increasing experimental and clinical evidence indicates that the immune system is a target for certain physical and chemical agents found in the workplace. Historically, three types of undesirable immune effects have been considered: (1) those determined by the response of immune defense mechanisms to the agent (i.e., hypersensitivity); (2) those determined by suppression of immune function with the potential for increased susceptibility to infectious agents or neoplasms; and (3) those determined by immune dysregulation (i.e., systemic or organ-specific autoimmunity). Although not relegated to specific immunity, recently, a fourth common interaction normally under the prevue of the immunotoxicologist are those which result in inflammation, as immune cells and mediators actively participate in this response. Inflammatory responses resulting from workplace exposures are usually observed in specific target organs, such as the lung, skin and liver and, if persistent, may progress to fibrosis, granulomatous disease or even cancer. Examples of workplace agents that induce chronic inflammation in the lung include fibers, such as asbestos and silica, and mixtures such as cotton dust, flocking materials and metal working fluids. Increased incidences of non-viral, non-alcohol liver hepatitis, that ultimately progress to cirrhosis, occur in certain workers, such as painters and printers, presumably due to solvent exposure. Dermal inflammation resulting from excessive ultraviolet radiation (UVR), as may occur in the construction and agricultural industries, can lead to immunosuppression and an increase in infectious skin diseases.

Certain of the ‘immunotoxicities’ are more prevalent in the workplace than others. By far, allergic contact dermatitis (ACD) and respiratory allergies (occupational asthma) are the most commonly reported workplace-related immune-mediated disease. According to the US Bureau of Labor Statistics, occupational skin diseases, mostly in the form of ACD or irritant contact dermatitis (ICD) is the second most common type of occupational disease. From 1983 to 1994, the rate of occupational skin disease, which is severely underreported, increased from 64 to 81 cases per 100,000 workers. With respect to occupational asthma, it had been reported that of the 10 million individuals in the United States with adult asthma, approximately 28% could be attributable to workplace exposures. Low molecular weight respiratory allergens, such as anhydrides and diisocyanates, are the most common cause of occupational asthma with 5000 to 10,000 workers in the United States alone, developing isocyanate-induced asthma each year. With respect to large molecular weight allergens, latex allergy has received considerable attention because of the widespread use of latex materials, particularly latex gloves in health care workers. Adverse reactions to latex products fall into three disease categories: ICD, ACD and IgE-mediated responses, with an inverse relationship between prevalence and severity.

Occupation is a major risk factor for nearly all communicable infectious diseases among adults. In particular, infectious diseases among healthcare workers is a concern where workers are exposed to patients with a high prevalence of hepatitis B and C, as well as tuberculosis and HIV. Animal studies have identified a number of chemicals with potential to cause immunosuppression where the prevalence of exposure to workers are high, such as pesticides and herbicides in agricultural workers and metal exposures in the manufacturing and chemical industries. A link between exposure to these agents and increased incidences of infectious or neoplastic diseases has been suggested in several clinical studies, but is yet to be considered

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conclusive by the scientific community at large. Likewise, there is limited but increasing epidemiologic and experimental studies linking autoimmune diseases and occupational exposure to agents such as silica, solvents, pesticides and UVR.

A question that has not yet received appropriate attention is whether special populations exist that are at increased risk of developing workplace-related immune-mediated diseases. Because of the paucity of data in this area, only two topics were selected for detailed discussion in this volume: the role of work-related stress on the immune system and the effects of workplace agents on the developing immune system. Yet to be established are the roles aging, gender or ethnicity play in occupational immune diseases.

We hope that the articles presented in this special issue stimulate greater interest in the areas of occupational disease and immunotoxicology. Both Dr. Meryl Karol and I would like to personally thank the contributing authors for their time and effort to prepare the series of reviews, and to the staff at Elsevier Publishers for giving us an opportunity to present the topic to their readers. We are also grateful to Dr. James Talmadge and Ms. Lisa Chudomelka at the editorial office for their invaluable advice and guidance, and to Ms. Teresa Cummins and Mr. Luke Thomas at NIOSH in helping us to prepare this special issue.

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